Cruise Report, Revelle RR1708
April 13 - April 24, 2017

Figure 1: R/V Roger Revelle in between mooring operations on April 15, 2017, north of Palau with Velasco reef to the left. Photo credit: Patrick Colins/Coral Reef Research Foundation.

Overview

The following is the cruise report for the mooring recovery and lee wave survey cruise of the Alford/MacKinnon/Voet project part of the ONR-funded Flow Encountering Abrupt Topography (FLEAT) experiment. The experiment aims at better understanding the response of low-frequency flows as they interact with the steep topography in the region north of Palau. In this part of the experiment we focused on lee waves that may me be generated by low-frequency flow across submarine ridges.

Our general plan was to recover 5 subsurface moorings that were deployed in June 2016 in the vicinity of Velasco Reef north of Palau. The moorings were a collaboration with Merrifield/UH and Nash/OSU and had been nested within an additional array deployed by Wijesekera/NRL in May 2016 and recoverd just before our cruise. The remaining time of the cruise was spent on towed lee wave surveys at three different sites along the submarine ridge north and south of the island of Yap. We ended the cruise in Guam.

Gear

Moorings

We recovered 5 subsurface moorings (diagrams in Figures 19-23, Table 1). All moorings were equipped with 75kHz and 300kHz RDI ADCPs, SBE37 CTDs, SBE56 and RBRSolo thermistors. In addition, mooring F1 was equipped with two McLane Moored Profilers in the lower part of the water column and moorings F2/F3/F4 were equipped with moored χ-pods which are used to estimate turbulent dissipation from thermal variance.

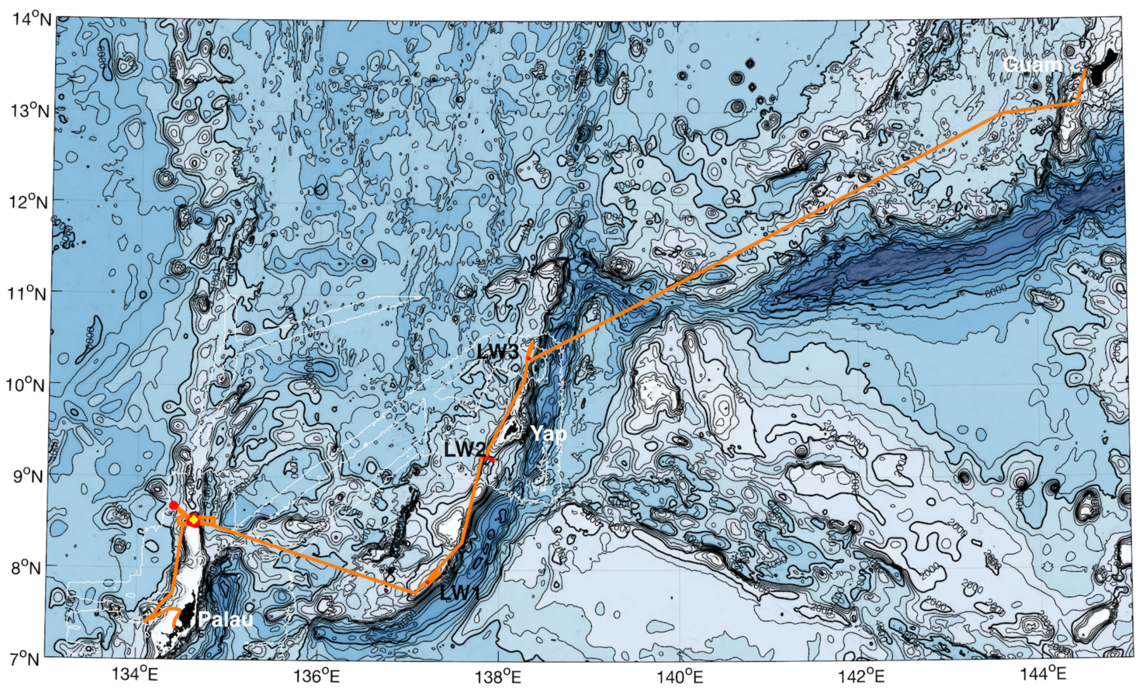


Figure 2: Map showing cruise track (orange, mooring locations (red), drifter deployment sites (yellow) and towyo sections (red, labeled LW1 to LW3). Bathymetry shown here is Smith & Sandwell, thin white contours indicate available multibeam coverage.

Lowered ADCP/CTD/χ-pod

For the lee wave surveys we used our realtime CTD/LADCP system, which has Deep Sea Power and Light Sea Batteries and upward and downward looking 300 kHz ADCPs (Fig. 4). We attached four of Jonathan Nash's "χ-pods" to estimate turbulent dissipation rate from thermal variance. We sent ADCP data up the SBE9's uplink channel and recorded/monitored it on our own laptop in the computer lab. We towed the instrument at speeds between 0.5 and 1.0 knots, cycling between 20 to 40 m above bottom and either the surface or some other set turnaround CTD depth.

Loadout

Timing

We began loading on April 10, one day earlier than anticipated due to the previous party being done a day early. It was a busy and hot loading day where we emptied out the 20′ container with tools and equipment that had been shipped from San Diego and craned everything on board. At the same time, we also received items that were stored in one of the Wijesekera containers, mostly empty boxes

Table 1: Mooring locations.

Station	Lat, Lon	Depth
F1	008° 40.838′ N, 134° 24.087′ E	3390
F2	008° 30.164′ N, 134° 35.508′ E	1515
F3	008° 32.723′ N, 134° 37.414′ E	1666
F4	008° 29.862′ N, 134° 38.723′ E	880
F6	008° 28.962′ N, 134° 38.575′ E	434

from the moored instruments, and craned them on board. A small group of people organized the transfer of equipment from Jennifer MacKinnon and Shaun Johnston, stored at the Coral Reef Research Foundation, to the port where we loaded it into our then empty container. On April 11th our container and three containers of the Wijesekera group were hieved on deck using a shore crane. The crane was also used to store bulky gear not needed for cruise operations on the bow 02 level. Around noon a group of Palauan high school students visited the Roger Revelle. Captain David Murline and computer tech Victor Adeyokunnu showed the students around on the ship and Gunnar Voet gave a brief overview on the research objectives of the cruise. On April 12th the science team finished setting up the deck and secured everything on deck and in the labs. We departed 1400 April 13.

Figure 3: Students and teachers from Mindzenty High School in Palau after touring the *R/V Roger Revelle* together with Captain David Murline and Chief Scientist Gunnar Voet.

Deck Setup

We set up the deck for mooring operations with the TSE-winch and a large block in the A-frame in the centerline on the main deck (Fig. 4). A wire spooler, parked in the hangar, was used to spool mooring wire off the TSE after mooring operations.

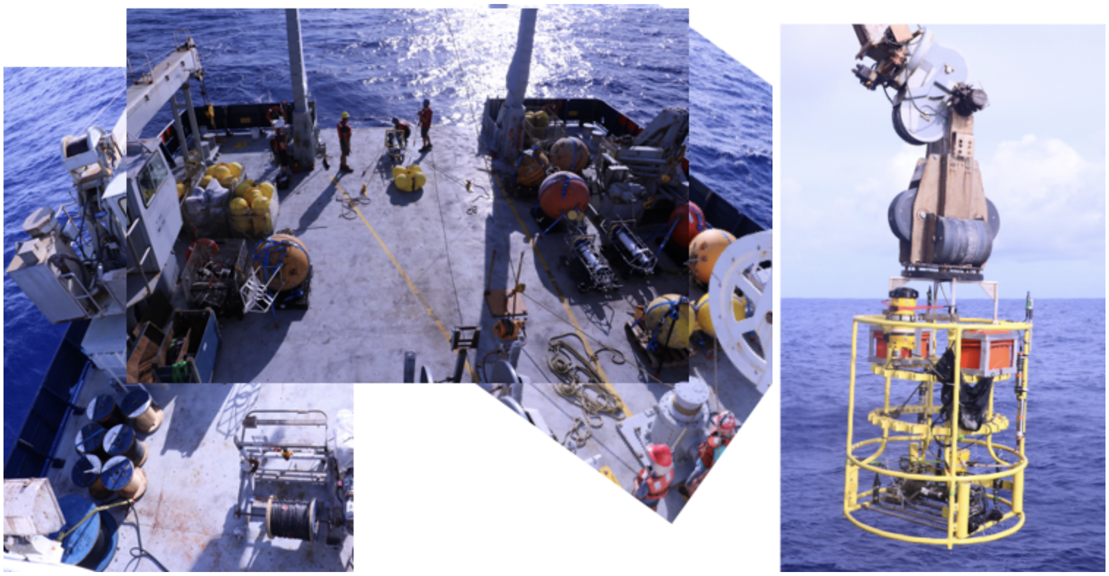


Figure 4: Deck layout (left) with TSE in the center, wire spooler to the left and capstain to the right. Rosette setup (right) with two seabatteries, ADCP up- and downlooker, two uplooking and two down-looking χ-pods and the CTD.

Lab Setup

As usual, we set up our science operations in the hydro lab and did mooring instrument work in the main lab. CTD/LADCP were operated from the computer lab and a data download station for LADCPs and χ-pods was set up in the wet lab.

Operations, Science and Data Report

Moorings

We began mooring recoveries at 5am on April 14th local time. We used the UDB 9000 deckset and the ship's transducers to communicate with the acoustic releases. Mooring locations are shown in Fig. 5 Mooring F6 was recovered before breakfast. We then recovered the tallest of the five moorings, F1, and mooring F4 towards the end of the day. Moorings F2 and F3 were recovered the following day. All acoustic releases worked flawlessly. No instruments were lost. The upper 100-200m of the moorings were covered with extensive amounts of barnacles (Fig. 6), which kept us busy cleaning instruments, mooring gear and deck for the days to follow.

A sample time-depth series of velocity from mooring F1 is shown in Fig. 7, with a zoom in on a one month period in fall shown in Fig. 8. A moderate eddy came by in mid October that knocked the mooring down around 80-90 m, but otherwise did not disrupt data. The ADCP stopped pinging for two short periods but resumed afterwards. Otherwise, sampling was perfect for the whole 10-month

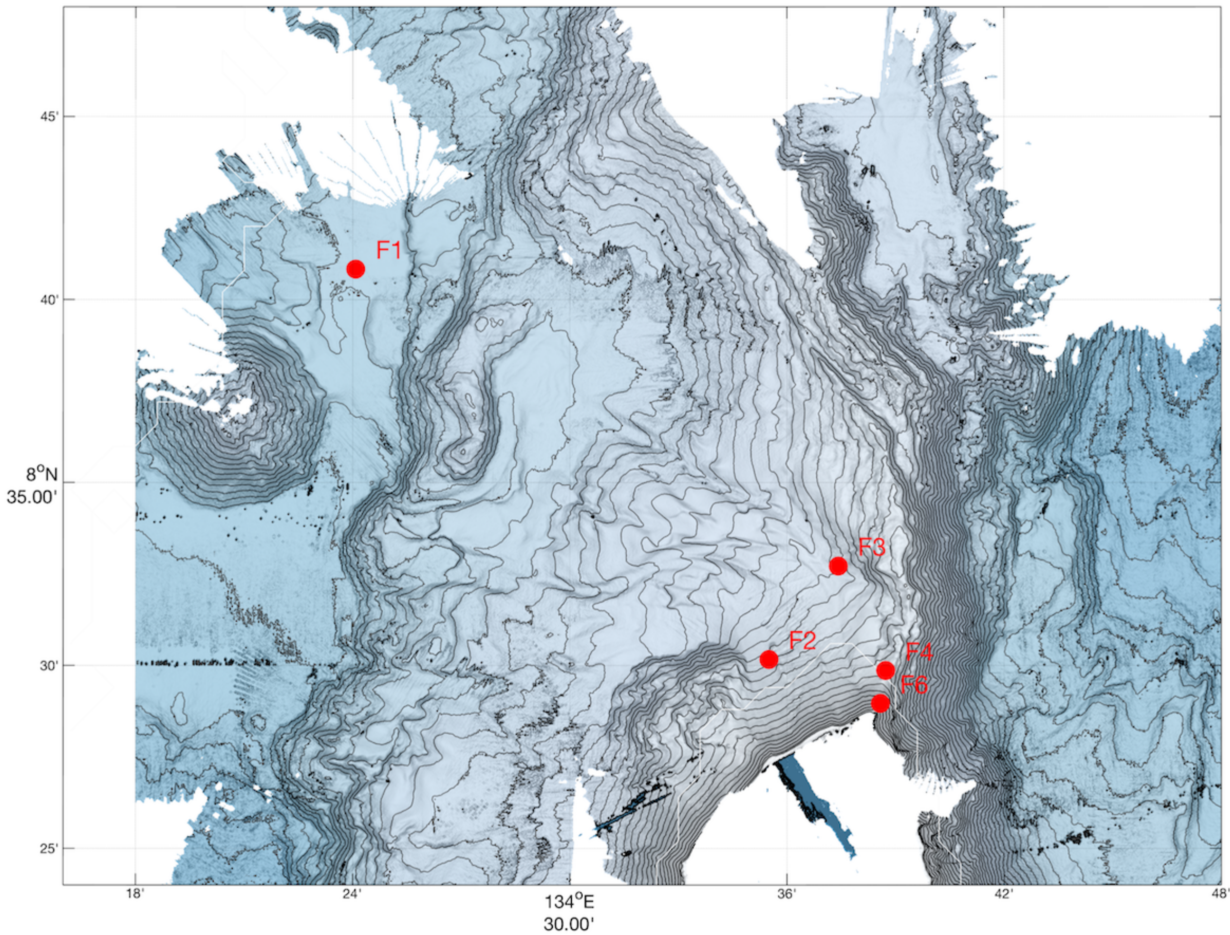


Figure 5: Mooring locations.

Figure 6: Mooring recoveries and barnacle growth. Upper left: Mika holding a grown-over SBE37 CTD. Upper right: Matt, Jonathan and Sara observe mooring wire overgrown with barnacles going through the traveling block. Lower: Overgrown 1/4″ mooring wire.

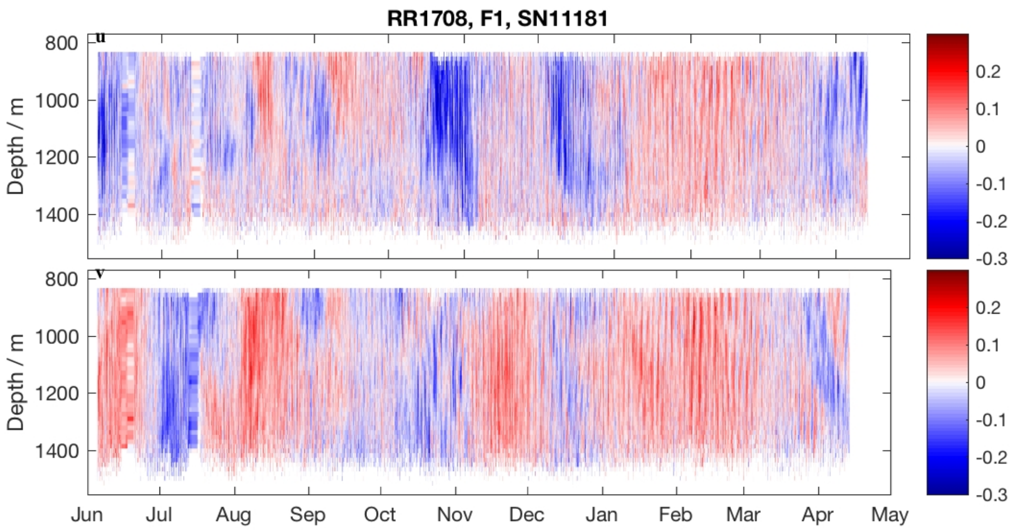


Figure 7: Time/depth series of u (top) and v velocity (bottom) from the middle long ranger ADCP on mooring F1, for the whole deployment period.

period.

Frequency spectra (Fig. 9) show strong semidiurnal and diurnal tidal peaks (and their harmonics). The mesoscale field appears as a red spectrum out to low frequencies. A broad near-inertial peak is seen at the expected frequency, which shows an excess of clockwise motions as expected. Wavenumber spectra (Fig. 10) show the severe rolloff at scales smaller than 100 m due to instrument resolution, but show an excess of downward energy propagation (counterclockwise).

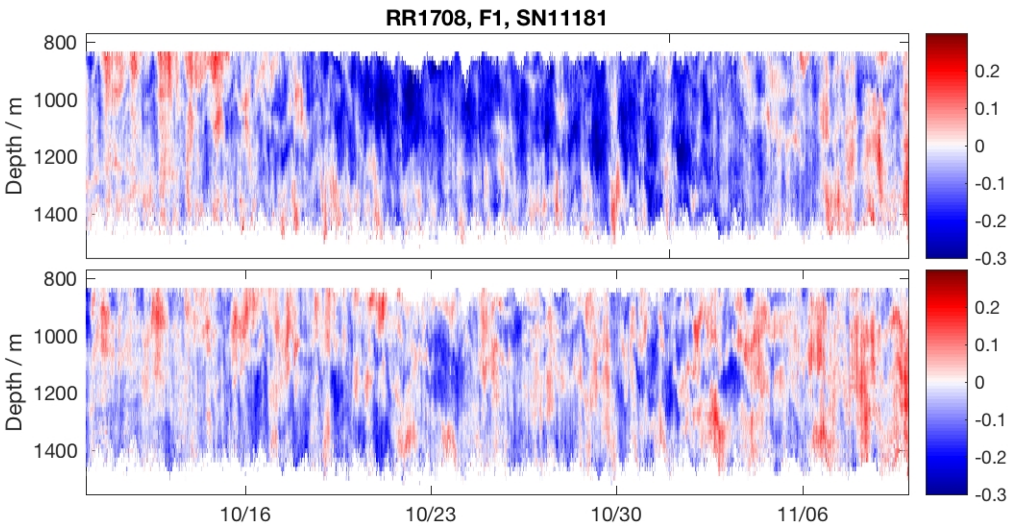


Figure 8: As previous but for a one-month zoomed period.

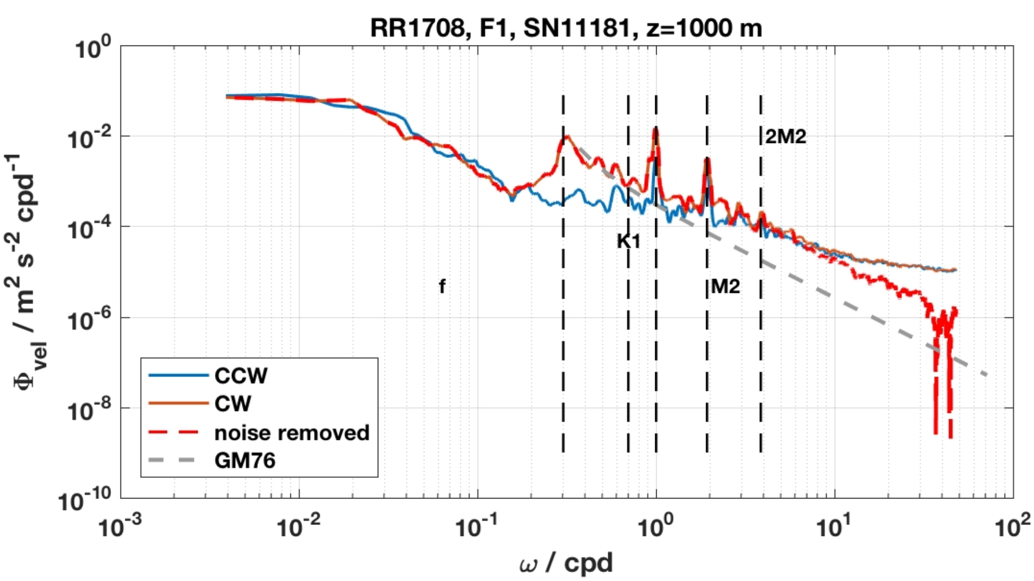


Figure 9: Rotary velocity spectra at 1000 m from the same mooring. The GM76 spectrum is also plotted.

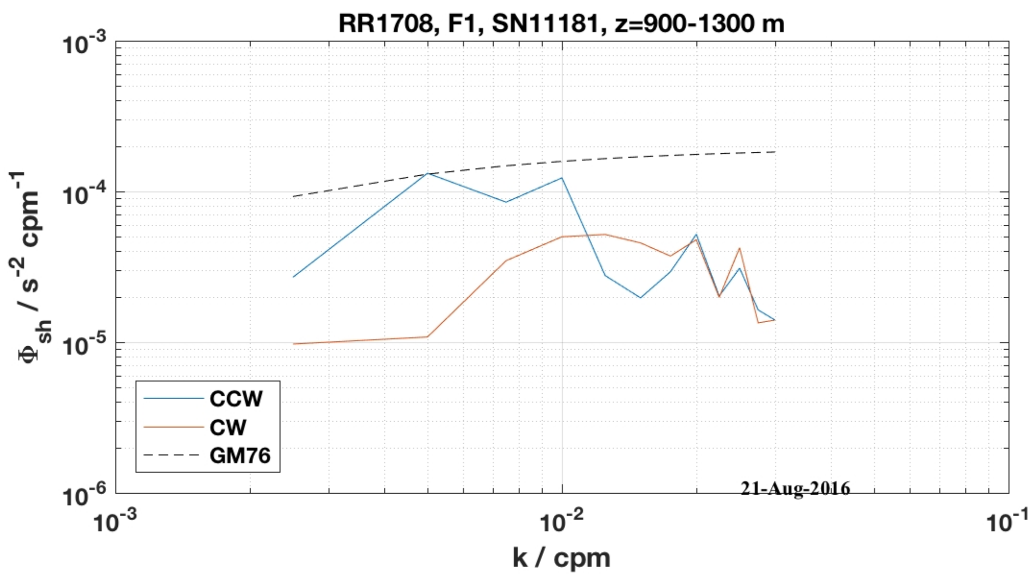


Figure 10: Representative rotary shear spectra for a single one-hour time period, with GM76 overplotted.

Shipboard ADCP survey

The night between mooring operations was used for a shipboard ADCP survey. We occupied a figure-eight pattern, spanning east and west of the ridge north of Velasco reef, at about 11 kts ship speed. The goal was to confirm strongly layered flow near the ridge as found in last years surveys, and to study the zonal extent of these layers as glider surveys along zonal lines away from the ridge did not reveal this layered pattern.

Velocities from the two occupations of the figure eight pattern are shown in Fig. 11. Layered flow, as observed during surveys in June 2016, was found over the ridge and stretches east- and westward. The sections as plotted in Fig. 11 are tidally aliased and will be detided for future analysis of the layered flow.

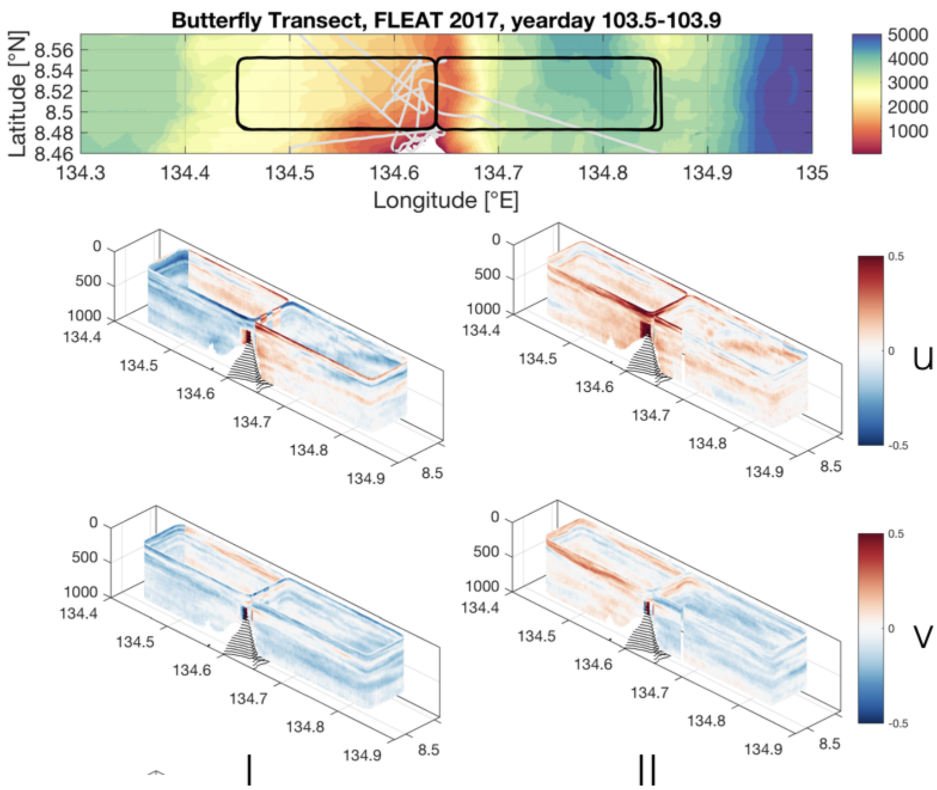


Figure 11: Two shipboard ADCP occupations of a figure-eight pattern north of Velasco reef. Upper panel: Bathymetry and survey ship track. Center panels: Zonal velocity of first (left) and second occupation (right). Lower panels: Meridional velocities. The reef edge is contoured in black lines in the velocity panels.

Lee wave surveys

We carried out lee wave surveys with the CTD/LADCP/χ-pod system at three different sites along the ridge north and south of Yap. Ridge crest depths varied from 640 m at the southern site, 1600 m just south of Yap and 3000 m at the site north of Yap (Fig. 12). At all three sites we conducted repeat towyo sections back and forth across the ridge crests over at least 24 and up to 70 hours. Towing speed and turnaround points along the repeat sections were chosen to maximize coverage in M2 phase space. An example for M2 phase space coverage at section LW3 is shown in Fig. 13.

At the deeper sites LW2 and LW3 we did not profile the whole water column and clamped a SBE37 CTD and a RBR Solo thermistor to the hydrowire at 900 and 600 m wire out, respectively, to gather hydrographic measurements over a greater extent of the water column.

At each site, we began profiling towards the bottom with a conservative 40 m height above seafloor turnaround target which was reduced to 20 m above bottom during subsequent ridge crossings. The LADCP uplink data stream proved once again vital for towyo operations, with the return intensity of the four ADCP beams functioning as reliable altimeter.

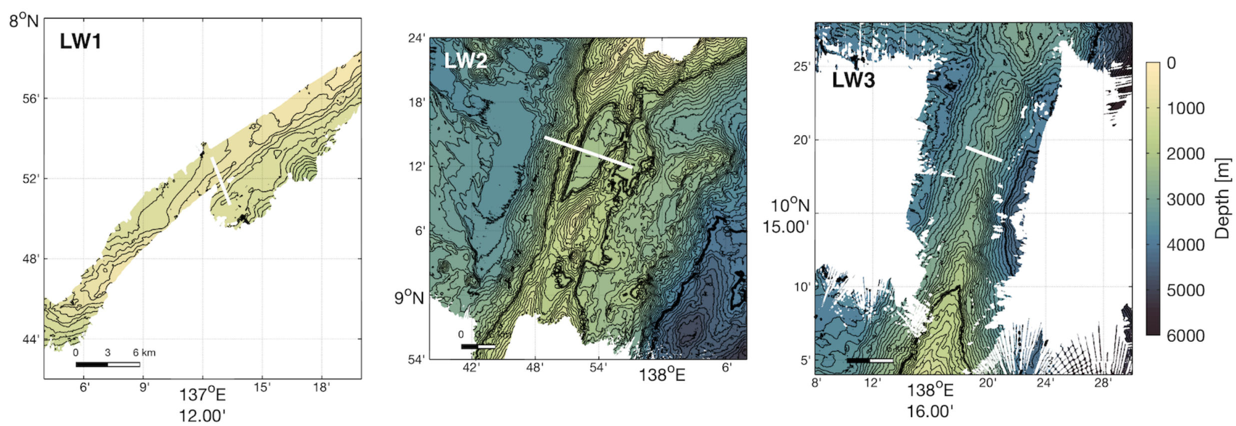


Figure 12: Maps of multibeam bathymetry both from previous cruises (compiled and provided by Harper Simmons/University of Alaska, Fairbanks) and the current cruise. Nominal lee wave survey repeat tracks are shown with white lines.

To determine survey sites over the submarine ridge along Yap we picked locations at three different depths from existing multibeam data (survey LW2) or, where multibeam was not abvailable, from Smith & Sandwell bathymetry (surveys LW1 and LW3). At the latter sites we took multibeam measurements along the ridge to determine optimal survey lines and inform towyo operations (Fig. 12).

In addition to bathymetric data we used HYCOM model output for an estimate of current fields at depth to guide our choice for lee wave surveys (Fig. 14). HYCOM assimilates a number of observations and provides close to real-time fields. An actual comparison between these fields and velocity measurements from the towyo surveys is still on our todo list.

Preliminary results from the three lee wave surveys are shown in Figs. 15-17. At all three sites we observed wave-like structures in the density field above the submarine ridges. Wave amplitudes reached up to 300 m in the vertical at the deepest site. The wave-like features were associated with

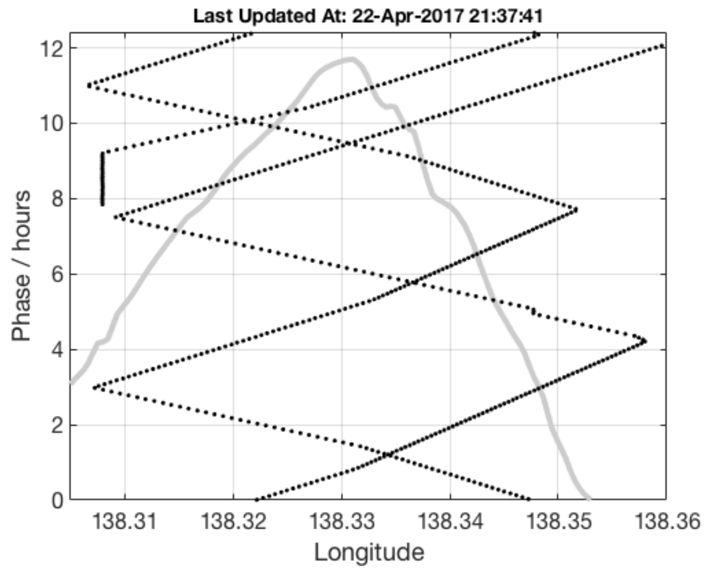


Figure 13: Phase-space coverage for the towyo survey LW3. The position of the ship along the repeat section and in M2 phase space is shown with black dots. A bathymetric cross-section of the submarine ridge is shown in gray.

high levels of turbulent dissipation reaching above 10^{-6} W/kg at all three ridges. Rates of turbulent dissipation estimated from Thorpe scales and from the chipods agreed well. Future analysis will aim at separating the breaking waves and associated turbulent mixing into tidal and low-frequency flow-generated parts.

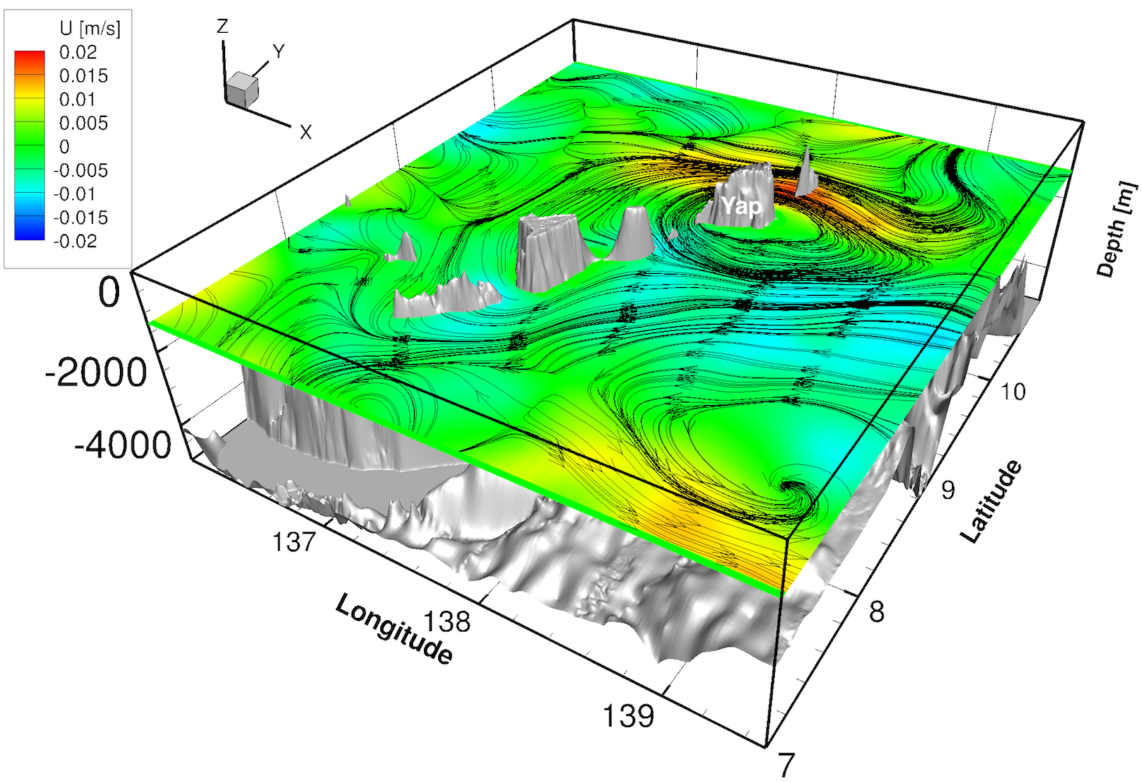


Figure 14: Example for HYCOM kinetic energy and velocity streamlines at 1250 m depth.

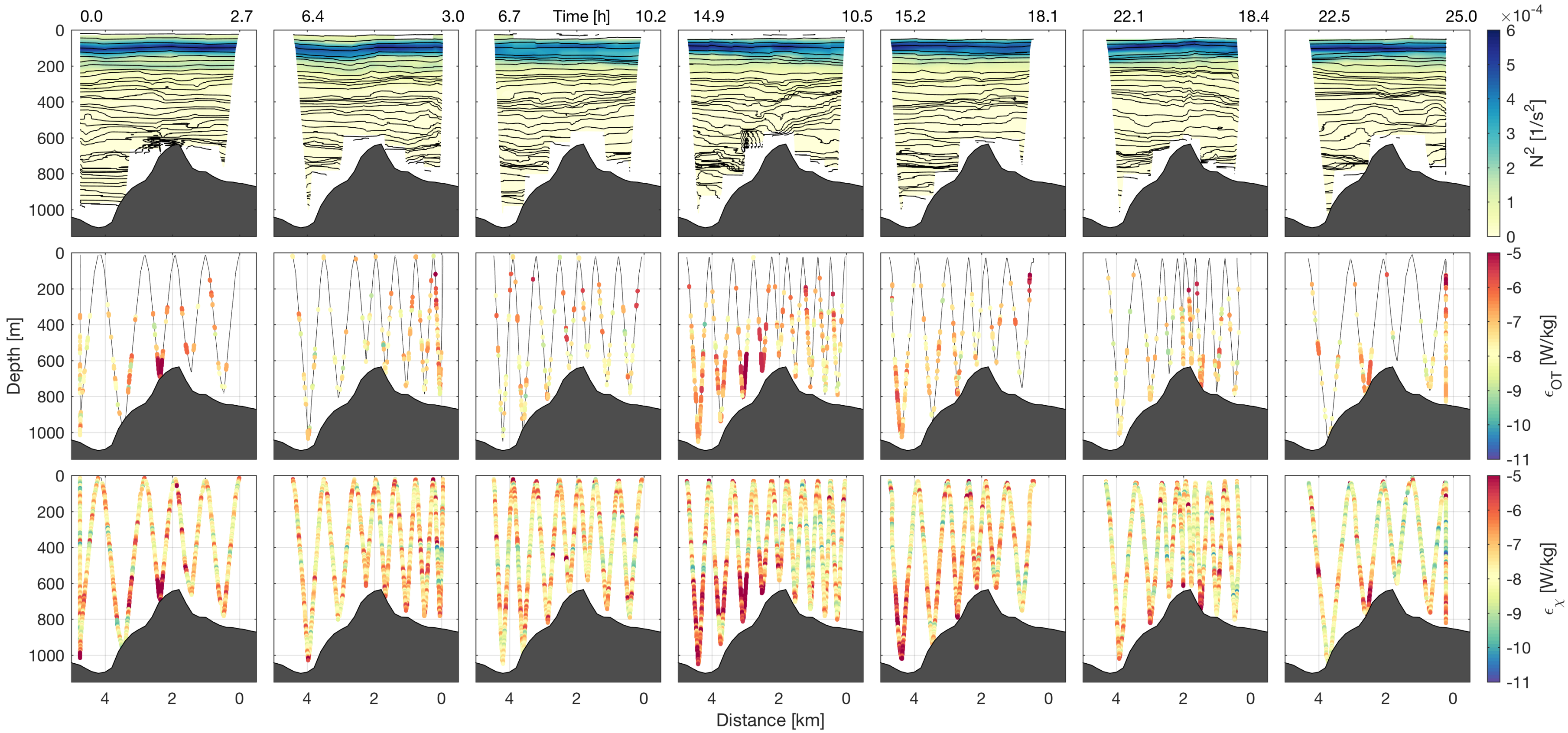


Figure 15: Towyo sections at LW1. Upper panels: Stratification and isopycnals evenly spaced in depth. Center panels: Turbulent dissipation estimated from Thorpe scales. Lower panels: Turbulent dissipation estimates from chipod data. Section start and end times in hours from survey start are shown above top panels. Approximate path of the towed package is shown with black lines on the center panels.

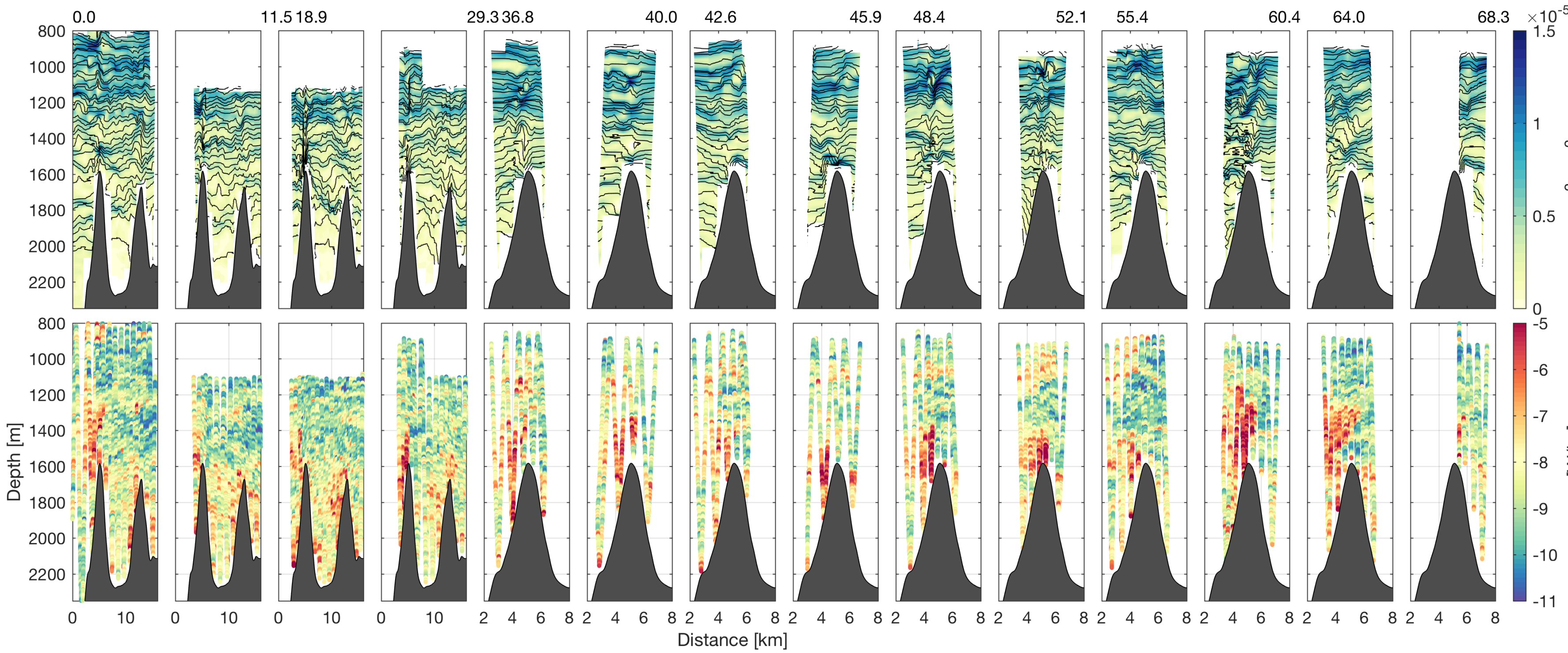


Figure 16: Towyo sections at LW2. Upper panels: Stratification and isopycnals evenly spaced in depth. Lower panels: Turbulent dissipation estimates from chipod data.

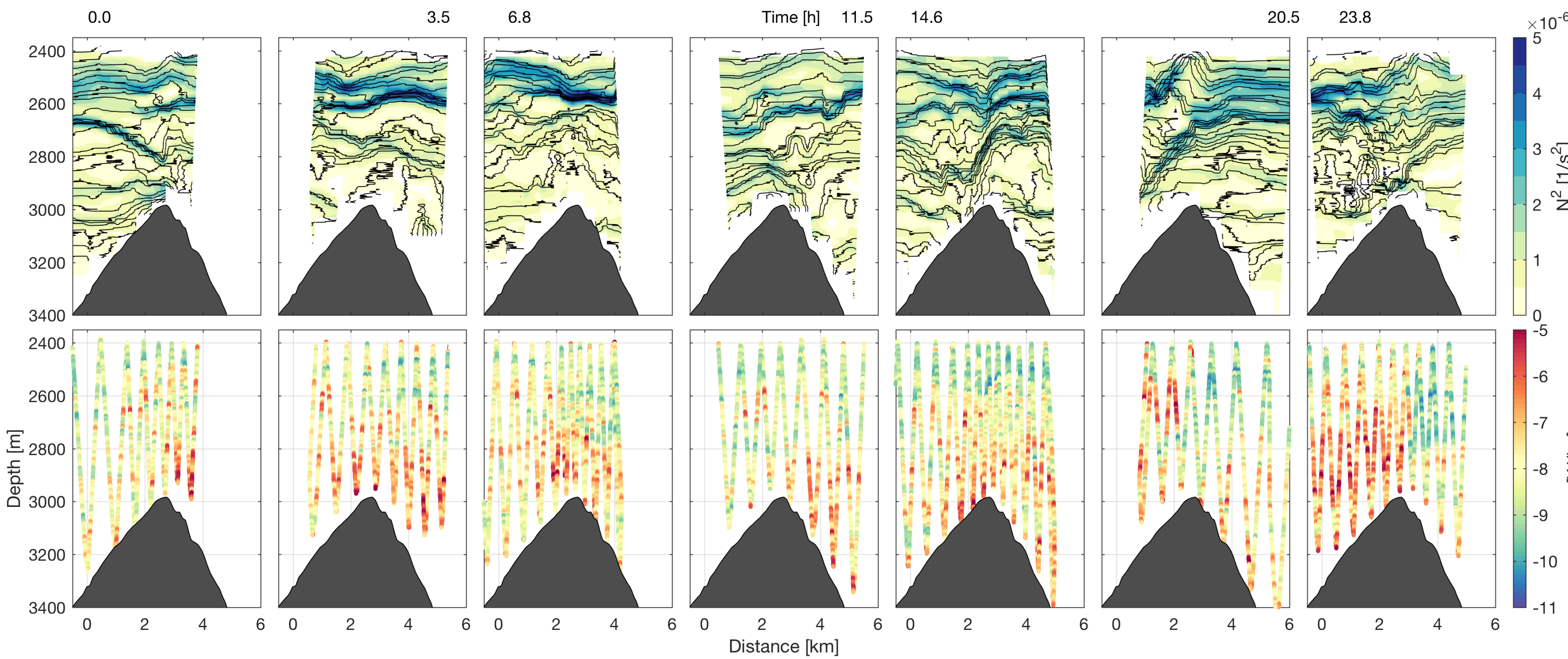


Figure 17: Towyo sections at LW3. Upper panels: Stratification and isopycnals evenly spaced in depth. Lower panels: Turbulent dissipation estimates from chipod data.

Personnel

Science party (11 plus STS personnel) and affiliations are as follows listed in Table 2. We stood 12-hour watches.

Table 2: Science Personnel and draft watches. A: 3am-3pm; B=3pm-3am. Asterisk = watch leader.

Who	Role	Inst.	Watch
Gunnar Voet	Chief Scientist	Scripps	
Matthew Alford*	PI	Scripps	A
Jonathan Ladner	Engineer	Scripps	B
Sara Goheen	Engineer	Scripps	A
Derek Young	Engineer	UH	B
Ali Mashayek	Postdoc	Scripps	A
Tyler Hennon	Postdoc	Scripps	A
Maddie Hamann*	Student	Scripps	B
Kristin Fitzmorris	Student	Scripps	B
Mika Siegelman	Student	UH	B
Conrad Luecke	Student	UM	A

Acknowledgements

We would like to take the opportunity to thank Captain David Murline and the whole crew of the Revelle for their outstanding support of our science operations.

Figure 18: The science party taking the rare opportunity of windy and rainy conditions for a group photo. From left to right Gunnar Voet, Derek Young, Matt Durham (Marine Tech), Maddie Hamann, Jonathan Ladner, Sara Goheen, Tyler Hennon, Mika Siegelman, Kristin Fitzmorris, Ali Mashayek, Matthew Alford, Conrad Luecke, Victor Adeyokunnu (Computer Tech) and Jim Convery (Marine Tech in training).

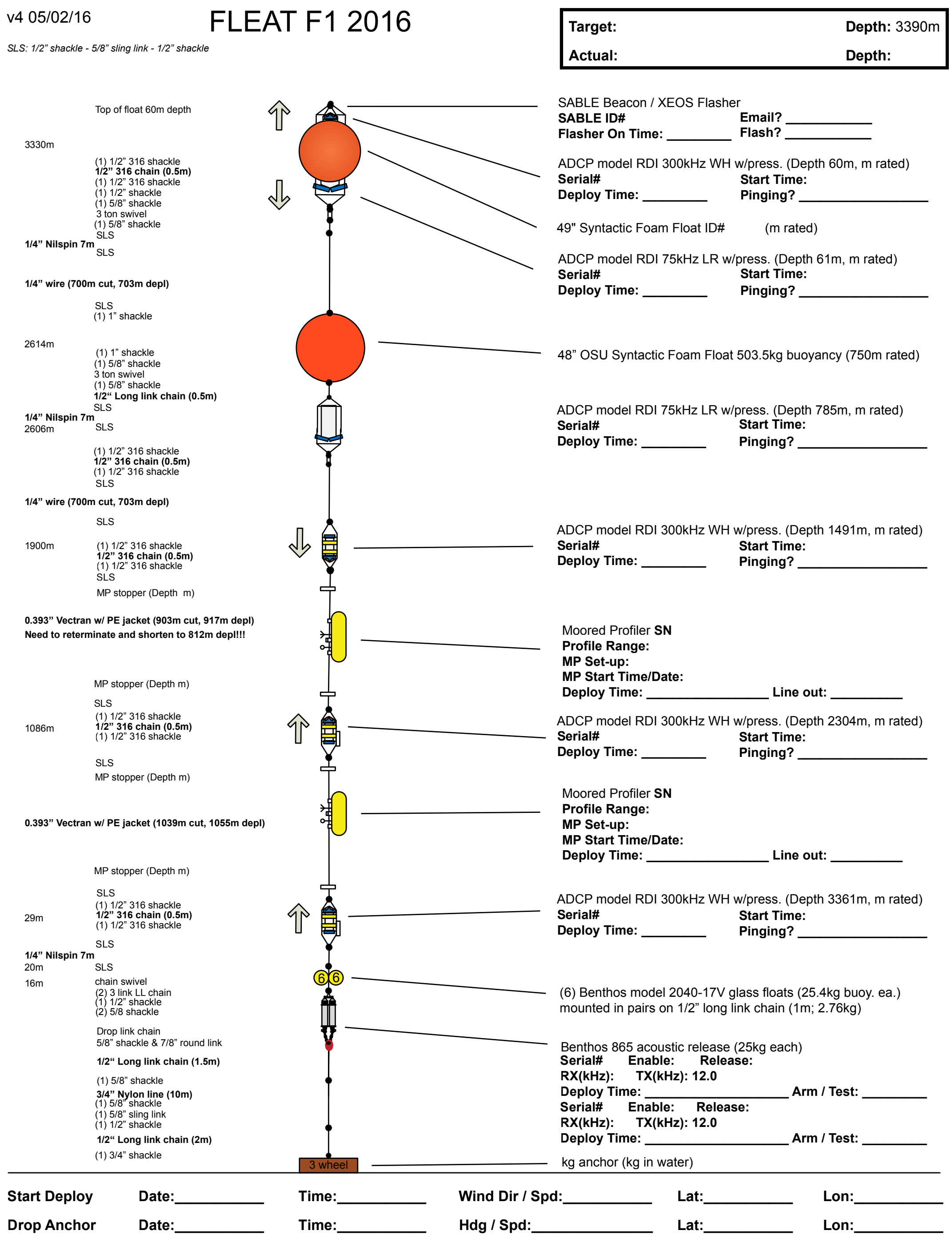
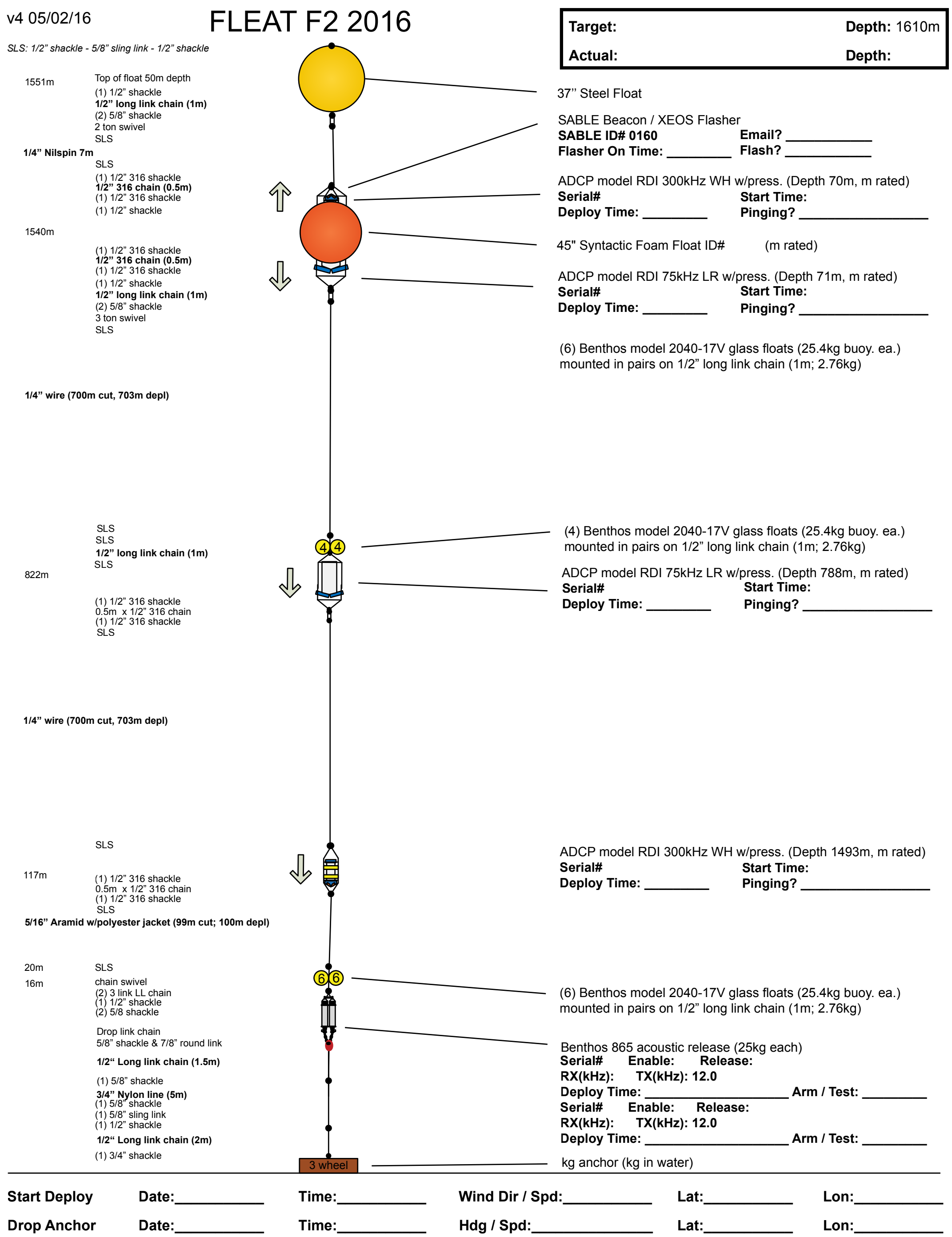

v4 05/02/16
FLEAT F1 2016
SLS: 1/2" shackle - 5/8" sling link - 1/2" shackle
Target: Depth: 3390m
Actual: Depth:
Top of float 60m depth
3330m
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
(1) 5/8" shackle
3 ton swivel
(1) 5/8" shackle
SLS
1/4" Nilspin 7m
SLS
1/4" wire (700m cut, 703m depl)
SLS
(1) 1" shackle
2614m
(1) 1" shackle
(1) 5/8" shackle
3 ton swivel
(1) 5/8" shackle
1/2" Long link chain (0.5m)
SLS
1/4" Nilspin 7m
2606m
SLS
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
SLS
1/4" wire (700m cut, 703m depl)
SLS
1900m
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
SLS
MP stopper (Depth m)
0.393" Vectran w/ PE jacket (903m cut, 917m depl)
Need to reterminate and shorten to 812m depl!!!
MP stopper (Depth m)
SLS
(1) 1/2" 316 shackle
1086m
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
SLS
MP stopper (Depth m)
0.393" Vectran w/ PE jacket (1039m cut, 1055m depl)
MP stopper (Depth m)
SLS
(1) 1/2" 316 shackle
29m
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
SLS
1/4" Nilspin 7m
20m
SLS
16m
chain swivel
(2) 3 link LL chain
(1) 1/2" shackle
(2) 5/8 shackle
Drop link chain
5/8" shackle & 7/8" round link
1/2" Long link chain (1.5m)
(1) 5/8" shackle
3/4" Nylon line (10m)
(1) 5/8" shackle
(1) 5/8" sling link
(1) 1/2" shackle
1/2" Long link chain (2m)
(1) 3/4" shackle
6 6
3 wheel
SABLE Beacon / XEOS Flasher
SABLE ID# Email? ___________
Flasher On Time: _________ Flash? ___________
ADCP model RDI 300kHz WH w/press. (Depth 60m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
49" Syntactic Foam Float ID# (m rated)
ADCP model RDI 75kHz LR w/press. (Depth 61m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
48" OSU Syntactic Foam Float 503.5kg buoyancy (750m rated)
ADCP model RDI 75kHz LR w/press. (Depth 785m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
ADCP model RDI 300kHz WH w/press. (Depth 1491m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
Moored Profiler SN
Profile Range:
MP Set-up:
MP Start Time/Date:
Deploy Time: _______________ Line out: _________
ADCP model RDI 300kHz WH w/press. (Depth 2304m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
Moored Profiler SN
Profile Range:
MP Set-up:
MP Start Time/Date:
Deploy Time: _______________ Line out: _________
ADCP model RDI 300kHz WH w/press. (Depth 3361m, m rated)
Serial# Start Time:
Deploy Time: _________ Pinging? _______________
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
Benthos 865 acoustic release (25kg each)
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: _______________ Arm / Test: ________
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: _______________ Arm / Test: ________
kg anchor (kg in water)
Start Deploy Date:__________ Time:__________ Wind Dir / Spd:__________ Lat:__________ Lon:__________
Drop Anchor Date:__________ Time:__________ Hdg / Spd:_____________ Lat:__________ Lon:__________

Figure 19: F1.



v4 05/02/16
FLEAT F2 2016
SLS: 1/2" shackle - 5/8" sling link - 1/2" shackle
Target:
Depth: 1610m
Actual:
Depth:
1551m
Top of float 50m depth
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
2 ton swivel
SLS
1/4" Nilspin 7m
SLS
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1540m
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
3 ton swivel
SLS
37" Steel Float
SABLE Beacon / XEOS Flasher
SABLE ID# 0160
Email? ____________
Flasher On Time: ________
Flash? ____________
ADCP model RDI 300kHz WH w/press. (Depth 70m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
45" Syntactic Foam Float ID# (m rated)
ADCP model RDI 75kHz LR w/press. (Depth 71m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
1/4" wire (700m cut, 703m depl)
SLS
SLS
1/2" long link chain (1m)
SLS
822m
(1) 1/2" 316 shackle
0.5m x 1/2" 316 chain
(1) 1/2" 316 shackle
SLS
4 4
(4) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
ADCP model RDI 75kHz LR w/press. (Depth 788m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
1/4" wire (700m cut, 703m depl)
SLS
117m
(1) 1/2" 316 shackle
0.5m x 1/2" 316 chain
(1) 1/2" 316 shackle
SLS
5/16" Aramid w/polyester jacket (99m cut; 100m depl)
ADCP model RDI 300kHz WH w/press. (Depth 1493m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
20m
SLS
16m
chain swivel
(2) 3 link LL chain
(1) 1/2" shackle
(2) 5/8 shackle
Drop link chain
5/8" shackle & 7/8" round link
1/2" Long link chain (1.5m)
(1) 5/8" shackle
3/4" Nylon line (5m)
(1) 5/8" shackle
(1) 5/8" sling link
(1) 1/2" shackle
1/2" Long link chain (2m)
(1) 3/4" shackle
6 6
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
Benthos 865 acoustic release (25kg each)
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: __________________ Arm / Test: ________
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: __________________ Arm / Test: ________
3 wheel
kg anchor (kg in water)
Start Deploy Date:___________ Time:___________ Wind Dir / Spd:___________ Lat:___________ Lon:___________
Drop Anchor Date:___________ Time:___________ Hdg / Spd:______________ Lat:___________ Lon:___________

Figure 20: F2.

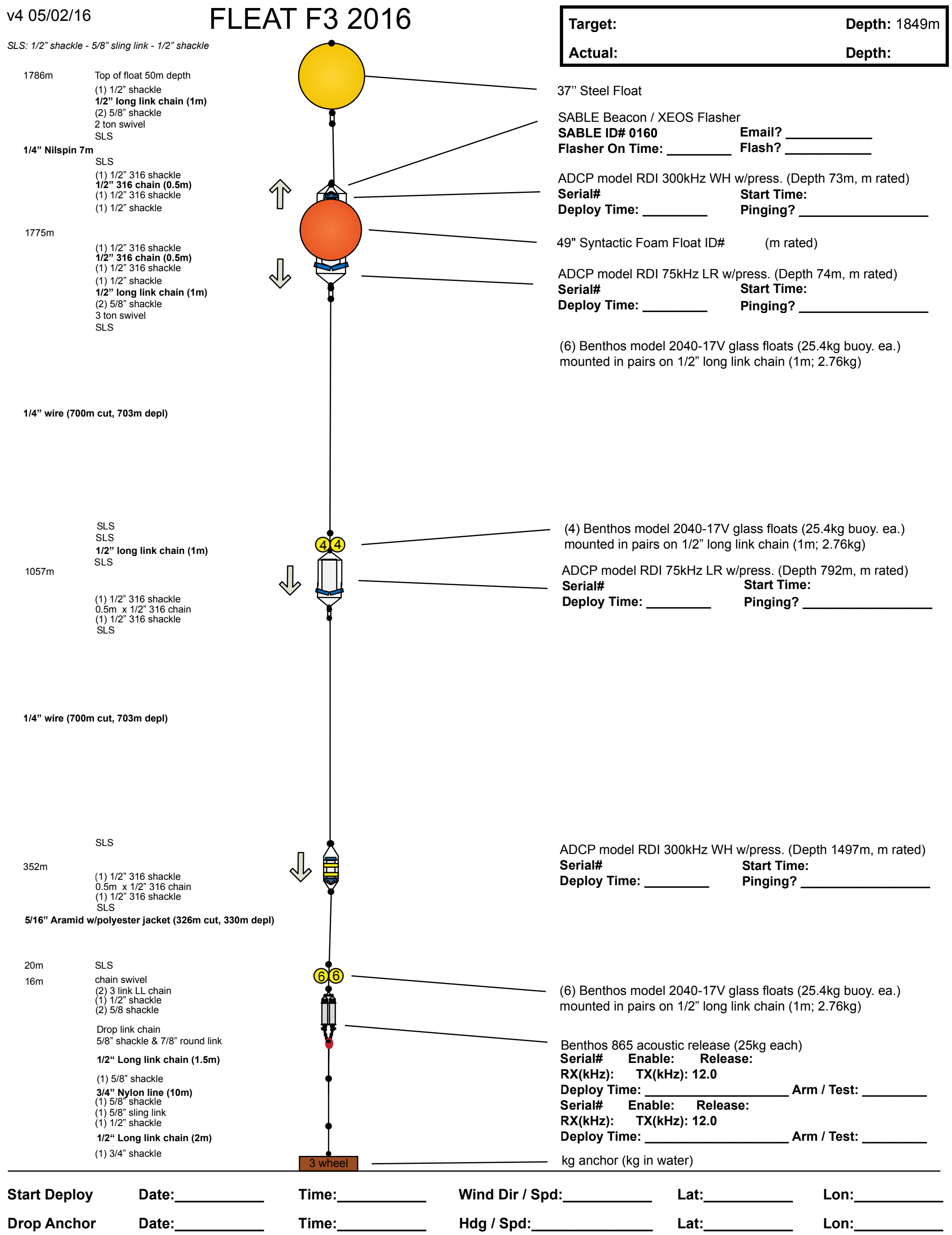

v4 05/02/16
FLEAT F3 2016
SLS: 1/2" shackle - 5/8" sling link - 1/2" shackle
Target:
Depth: 1849m
Actual:
Depth:
1786m
Top of float 50m depth
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
2 ton swivel
SLS
1/4" Nilspin 7m
SLS
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1775m
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
3 ton swivel
SLS
37" Steel Float
SABLE Beacon / XEOS Flasher
SABLE ID# 0160
Email? ___________
Flasher On Time: ________
Flash? ___________
ADCP model RDI 300kHz WH w/press. (Depth 73m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
49" Syntactic Foam Float ID# (m rated)
ADCP model RDI 75kHz LR w/press. (Depth 74m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
1/4" wire (700m cut, 703m depl)
SLS
SLS
1/2" long link chain (1m)
SLS
1057m
(1) 1/2" 316 shackle
0.5m x 1/2" 316 chain
(1) 1/2" 316 shackle
SLS
4
4
(4) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
ADCP model RDI 75kHz LR w/press. (Depth 792m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
1/4" wire (700m cut, 703m depl)
SLS
352m
(1) 1/2" 316 shackle
0.5m x 1/2" 316 chain
(1) 1/2" 316 shackle
SLS
5/16" Aramid w/polyester jacket (326m cut, 330m depl)
ADCP model RDI 300kHz WH w/press. (Depth 1497m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
20m
SLS
16m
chain swivel
(2) 3 link LL chain
(1) 1/2" shackle
(2) 5/8 shackle
Drop link chain
5/8" shackle & 7/8" round link
1/2" Long link chain (1.5m)
(1) 5/8" shackle
3/4" Nylon line (10m)
(1) 5/8" shackle
(1) 5/8" sling link
(1) 1/2" shackle
1/2" Long link chain (2m)
(1) 3/4" shackle
6
6
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
Benthos 865 acoustic release (25kg each)
Serial#
Enable:
Release:
RX(kHz):
TX(kHz): 12.0
Deploy Time: ________________
Arm / Test: ________
Serial#
Enable:
Release:
RX(kHz):
TX(kHz): 12.0
Deploy Time: ________________
Arm / Test: ________
3 wheel
kg anchor (kg in water)
Start Deploy
Date:__________
Time:__________
Wind Dir / Spd:__________
Lat:__________
Lon:__________
Drop Anchor
Date:__________
Time:__________
Hdg / Spd:______________
Lat:__________
Lon:__________

Figure 21: F3.

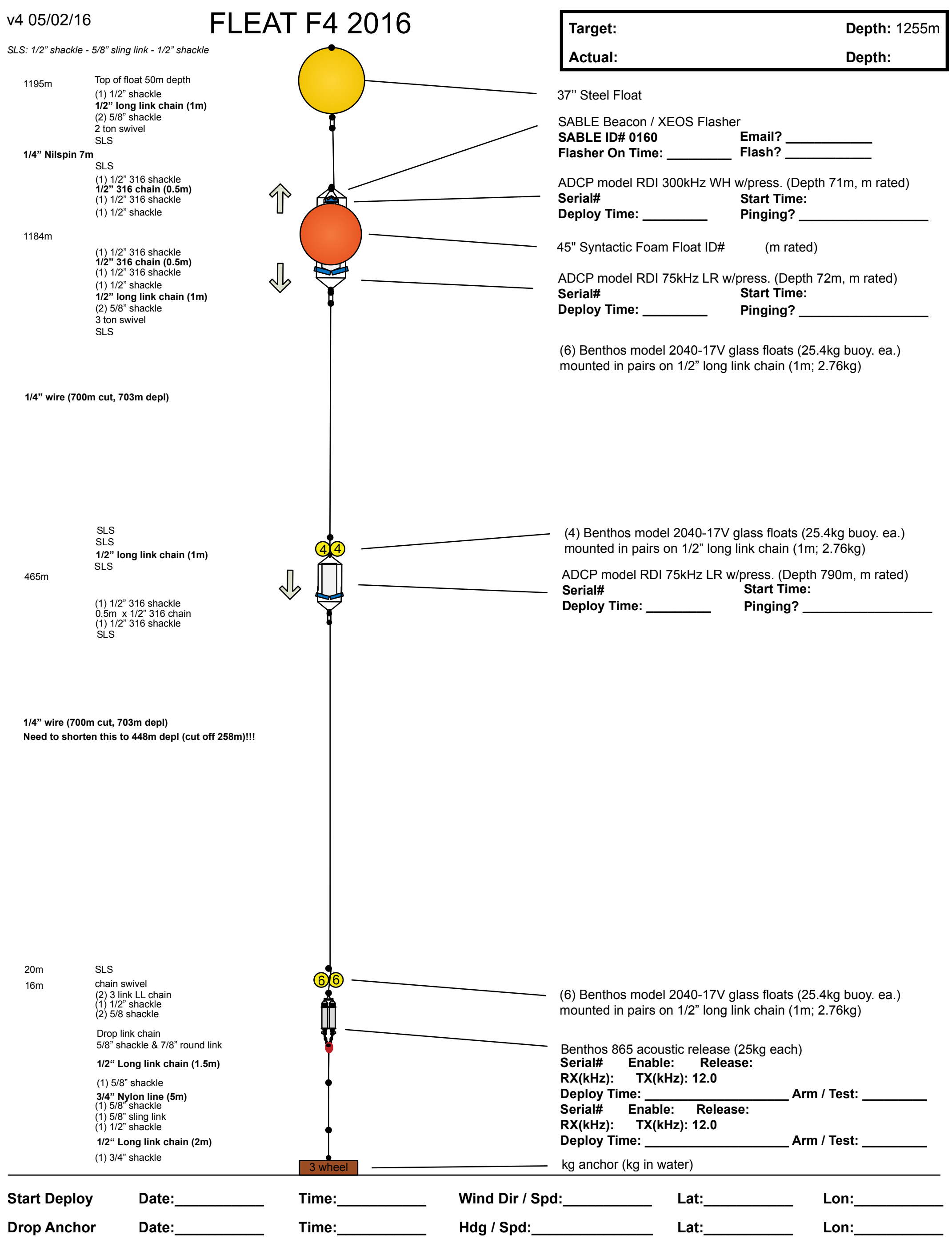
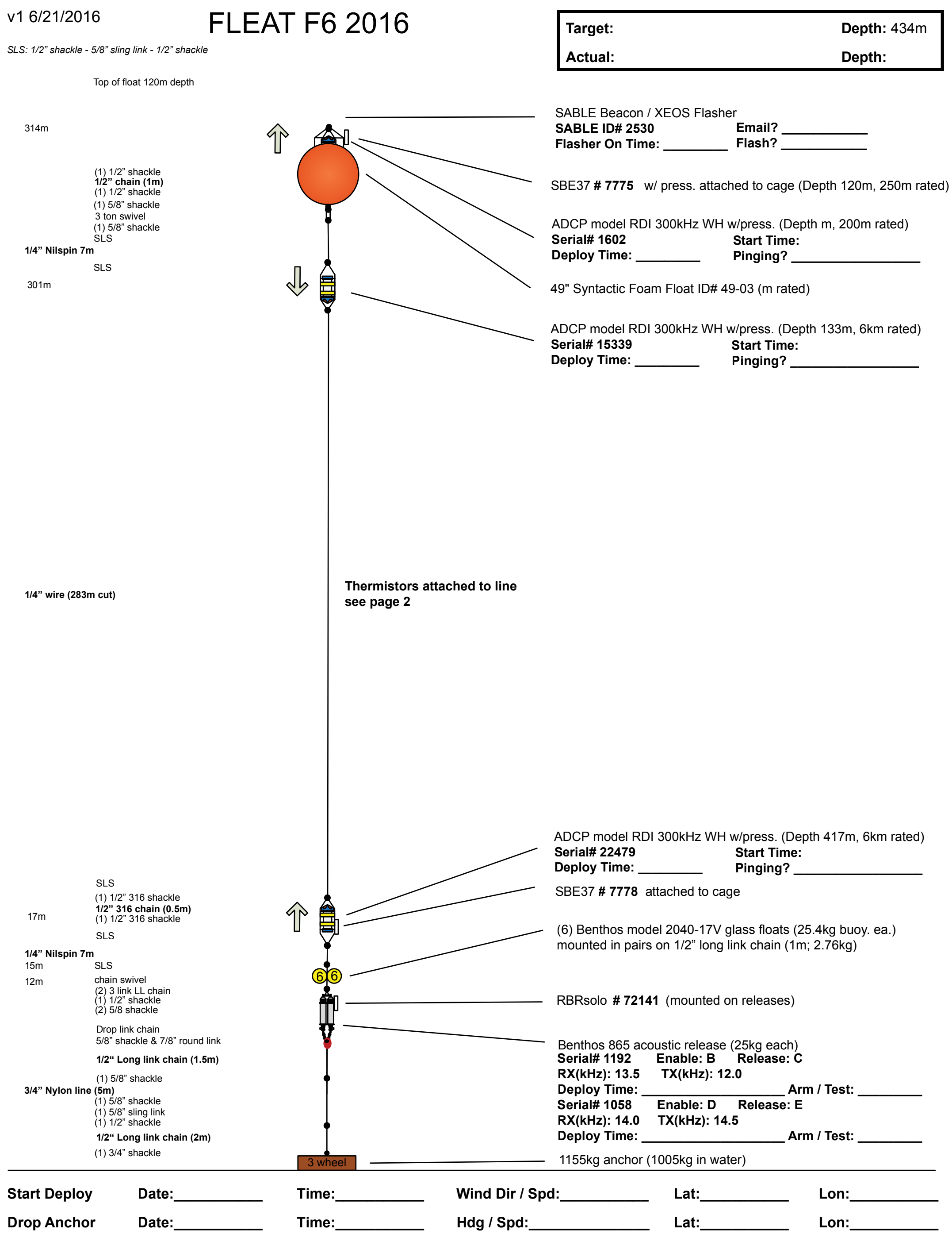

v4 05/02/16
FLEAT F4 2016
SLS: 1/2" shackle - 5/8" sling link - 1/2" shackle
Target:
Depth: 1255m
Actual:
Depth:
1195m
Top of float 50m depth
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
2 ton swivel
SLS
1/4" Nilspin 7m
SLS
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1184m
(1) 1/2" 316 shackle
1/2" 316 chain (0.5m)
(1) 1/2" 316 shackle
(1) 1/2" shackle
1/2" long link chain (1m)
(2) 5/8" shackle
3 ton swivel
SLS
37" Steel Float
SABLE Beacon / XEOS Flasher
SABLE ID# 0160
Email? ___________
Flasher On Time: ________
Flash? ___________
ADCP model RDI 300kHz WH w/press. (Depth 71m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
45" Syntactic Foam Float ID# (m rated)
ADCP model RDI 75kHz LR w/press. (Depth 72m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
1/4" wire (700m cut, 703m depl)
SLS
SLS
1/2" long link chain (1m)
SLS
465m
(1) 1/2" 316 shackle
0.5m x 1/2" 316 chain
(1) 1/2" 316 shackle
SLS
4
4
(4) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
ADCP model RDI 75kHz LR w/press. (Depth 790m, m rated)
Serial#
Start Time:
Deploy Time: ________
Pinging? ________________
1/4" wire (700m cut, 703m depl)
Need to shorten this to 448m depl (cut off 258m)!!!
20m
SLS
16m
chain swivel
(2) 3 link LL chain
(1) 1/2" shackle
(2) 5/8 shackle
Drop link chain
5/8" shackle & 7/8" round link
1/2" Long link chain (1.5m)
(1) 5/8" shackle
3/4" Nylon line (5m)
(1) 5/8" shackle
(1) 5/8" sling link
(1) 1/2" shackle
1/2" Long link chain (2m)
(1) 3/4" shackle
6
6
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2" long link chain (1m; 2.76kg)
Benthos 865 acoustic release (25kg each)
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: ________________ Arm / Test: ________
Serial# Enable: Release:
RX(kHz): TX(kHz): 12.0
Deploy Time: ________________ Arm / Test: ________
3 wheel
kg anchor (kg in water)
Start Deploy Date:__________ Time:__________ Wind Dir / Spd:__________ Lat:__________ Lon:__________
Drop Anchor Date:__________ Time:__________ Hdg / Spd:_____________ Lat:__________ Lon:__________

Figure 22: F4.



v1 6/21/2016
FLEAT F6 2016
SLS: 1/2” shackle - 5/8” sling link - 1/2” shackle
Target:
Depth: 434m
Actual:
Depth:
Top of float 120m depth
314m
(1) 1/2” shackle
1/2” chain (1m)
(1) 1/2” shackle
(1) 5/8” shackle
3 ton swivel
(1) 5/8” shackle
SLS
1/4” Nilspin 7m
SLS
301m
SABLE Beacon / XEOS Flasher
SABLE ID# 2530
Email? ___________
Flasher On Time: ________
Flash? ___________
SBE37 # 7775 w/ press. attached to cage (Depth 120m, 250m rated)
ADCP model RDI 300kHz WH w/press. (Depth m, 200m rated)
Serial# 1602
Start Time:
Deploy Time: ________
Pinging? ________________
49" Syntactic Foam Float ID# 49-03 (m rated)
ADCP model RDI 300kHz WH w/press. (Depth 133m, 6km rated)
Serial# 15339
Start Time:
Deploy Time: ________
Pinging? ________________
1/4” wire (283m cut)
Thermistors attached to line
see page 2
ADCP model RDI 300kHz WH w/press. (Depth 417m, 6km rated)
Serial# 22479
Start Time:
Deploy Time: ________
Pinging? ________________
SBE37 # 7778 attached to cage
SLS
(1) 1/2” 316 shackle
1/2” 316 chain (0.5m)
17m
(1) 1/2” 316 shackle
SLS
1/4” Nilspin 7m
15m
SLS
12m
chain swivel
(2) 3 link LL chain
(1) 1/2” shackle
(2) 5/8 shackle
Drop link chain
5/8” shackle & 7/8” round link
1/2“ Long link chain (1.5m)
(1) 5/8” shackle
3/4” Nylon line (5m)
(1) 5/8” shackle
(1) 5/8” sling link
(1) 1/2” shackle
1/2“ Long link chain (2m)
(1) 3/4” shackle
(6) Benthos model 2040-17V glass floats (25.4kg buoy. ea.)
mounted in pairs on 1/2” long link chain (1m; 2.76kg)
6 6
RBRsolo # 72141 (mounted on releases)
Benthos 865 acoustic release (25kg each)
Serial# 1192 Enable: B Release: C
RX(kHz): 13.5 TX(kHz): 12.0
Deploy Time: ________________ Arm / Test: ________
Serial# 1058 Enable: D Release: E
RX(kHz): 14.0 TX(kHz): 14.5
Deploy Time: ________________ Arm / Test: ________
3 wheel
1155kg anchor (1005kg in water)
Start Deploy Date:__________ Time:__________ Wind Dir / Spd:__________ Lat:__________ Lon:__________
Drop Anchor Date:__________ Time:__________ Hdg / Spd:______________ Lat:__________ Lon:__________

Figure 23: F6.